

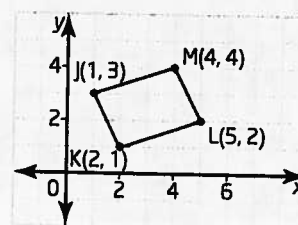
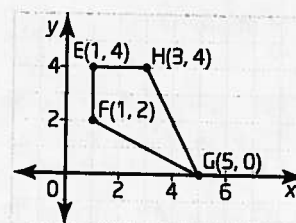
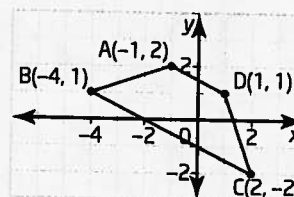


Key Concepts

- You can use the formulas for lengths, midpoints, and slopes to verify properties of quadrilaterals.
- Often, there is more than one way to verify a property of a geometric shape.

Communicate Your Understanding

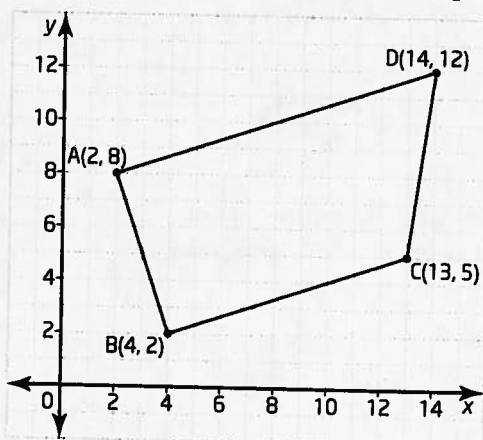
- C1** Describe how to use analytic geometry to verify that quadrilateral ABCD is a trapezoid.
- C2** Describe how to verify that the point of intersection of the diagonals of kite EFGH bisects only one of the diagonals.
- C3** Describe two methods for verifying that quadrilateral JKLM is a parallelogram. Which method is easier to use?



Practise

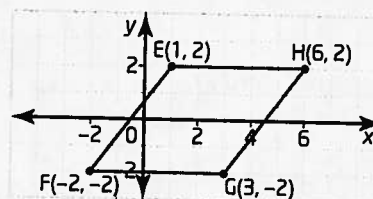
For help with question 1, see Example 1.

1. Verify that quadrilateral ABCD is a trapezoid.

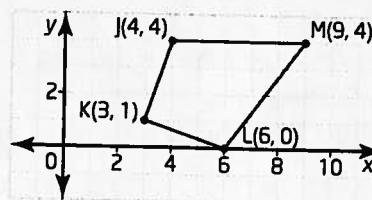


For help with questions 2 and 3, see Example 2.

2. Verify that quadrilateral EFGH is a rhombus.

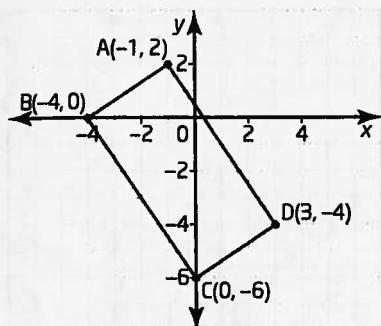


3. Verify that quadrilateral JKLM is a kite.

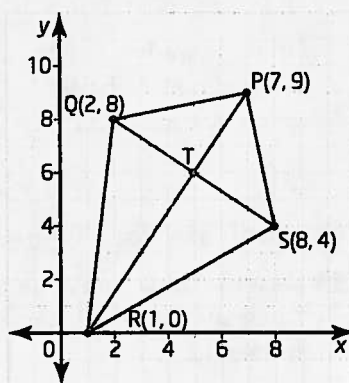


Connect and Apply

4. a) Verify that quadrilateral ABCD is a rectangle.
b) Verify that the diagonals of ABCD are equal in length and bisect each other.



10. a) Verify that PR bisects QS at right angles.
b) Verify that QS does not bisect PR.



5. a) Draw the quadrilateral with vertices $P(0, 7)$, $Q(-2, 1)$, $R(4, -1)$, and $S(6, 3)$.
b) Find the midpoint of each side. Join the midpoints of adjacent sides to form a new quadrilateral TUVW.
c) Verify that opposite sides of TUVW are parallel.
d) Verify that opposite sides of TUVW are equal in length.
6. **Use Technology** Use geometry software to answer question 5. Outline your method.
7. a) Draw the trapezoid with vertices $A(-2, -2)$, $B(2, -2)$, $C(4, 1)$, and $D(2, 4)$.
b) Verify that the line segment joining the midpoints of the non-parallel sides of the trapezoid is parallel to the other two sides.
8. **Use Technology** Use geometry software to answer question 7. Outline your method.
9. a) Verify that the diagonals of the rectangle with vertices $J(-2, 1)$, $K(2, 3)$, $L(4, -1)$, and $M(0, -3)$ bisect each other at right angles.
b) Do all rectangles have this property?
c) What can you conclude about the lengths of the sides of JKLM? Explain your reasoning.

11. a) Draw the quadrilateral with vertices $A(3, 4)$, $B(-1, 2)$, $C(-3, -4)$, and $D(5, -6)$. Then, join the midpoints of the adjacent sides of ABCD to form a new quadrilateral, EFGH.
b) Verify that EFGH is a rhombus.
c) Describe another method for verifying that EFGH is a rhombus.
12. a) Draw the quadrilateral with vertices $P(-3, -1)$, $Q(3, 1)$, $R(7, 5)$, and $S(1, 3)$. Then, draw the diagonals of PQRS.
b) Verify that the diagonals bisect each other.
c) What kind of quadrilateral is PQRS? Justify your answer.
13. **Use Technology** Use geometry software to answer question 12. Outline your method.
14. a) Draw the rhombus with vertices $A(-5, 2)$, $B(-1, 3)$, $C(-2, -1)$, and $D(-6, -2)$.
b) Verify that joining the midpoints of the adjacent sides of ABCD produces a rectangle.
15. **Use Technology** Use geometry software to answer question 14. Outline your method.